

Extraction of an Impacted Maxillary Canine with Immediate Implant Placement

Impaction can cause a number of detrimental conditions, often necessitating their removal.

By Lanka Mahesh, BDS, MBA | Maurice Salama, DMD | Gregori M. Kurtzman, DDS, DICOI

Impaction of the maxillary canine and maxillary/mandibular third molars is a common phenomenon. With regard to the maxillary canine, this can result in poor esthetics, orthodontic complications, and hampering of implant placement in this area. Impacted third molars frequently cause periodontal issues with the adjacent second molars due to

pocket formation on the distal aspect of the second molars. Thus, it is advised to extract impacted third molars and sometimes canines.

The literature demonstrates that after third molars, canines are the next most frequently found impacted tooth.^{1,2} Impacted canines can be brought into occlusion with orthodontic therapy and reimplantation^{3,4} but this depends upon the position of the impacted canine within the maxilla. When these procedures are not clinically feasible or the patient does not desire orthodontic treatment, then surgical removal of the impacted canine is recommended to correct the defect, resulting in occlusal asymmetry and poor esthetics. Thus, implant placement may become necessary to replace the missing tooth. In some cases, bone graft substitutes can be used to fill the defect and provide primary stability to the implant.

Immediate implant placement has evolved from a pilot study to a predictable procedure.^{5,6} Several investigators have reported a success rate of 93.6% and higher when these implants are followed for 2 and 5 years.^{7,8} The main advantage of immediate implant placement is bone preservation, shorter treatment duration, and subjecting the patient to fewer surgical procedures. However, in some cases, there can be insufficient availability of bone. Several authors, such as Mazor et al,⁹ Cardaropoli et al,¹⁰ and Penarrocha et al,¹¹ have reported successful treatment when immediate implant placement was done in extracted impacted

canine sites along with the use of bone grafts. According to Penarrocha, an immediate implant can be placed if apical and ridge crest bone remain after the extraction of the maxillary canines.¹¹

Case Report

A patient reported to the dental office with the complaint of a loose tooth. A

grade 3 mobility to the left maxillary lateral incisor was noted on clinical examination. An impacted canine was noted positioned apically and labially to the maxillary lateral incisor on radiographic evaluation (Figure 1). The patient was educated about the dental condition and consent was taken from the patient regarding the recommended treatment. The treatment recommended would include extraction of the mobile lateral incisor as well as the impacted canine, followed by osseous grafting of the resulting defect and immediate implant placement. Restoration would be with a custom abutment and zirconia monolithic crown cemented to the abutment.

A full-thickness flap was elevated following a semilunar flap incision at the mucogingival junction. Upon flap reflection, the coronal aspect of the impacted canine was visualized in the



FIG. 1

PREOPERATIVE CONDITION (1.) Radiograph demonstrating the impacted left maxillary canine.



LANKA MAHESH,
BDS, MBA
Private Practice
New Delhi, India



MAURICE SALAMA, DMD
Clinical Assistant Professor
of Periodontics
University of Pennsylvania
Philadelphia, Pennsylvania
Clinical Assistant Professor
of Periodontics
Georgia Health Sciences
University
Augusta, Georgia
Private Practice
Atlanta, Georgia



GREGORI M. KURTZMAN
Private Practice
Silver Spring, Maryland

buccal vestibule (Figure 2). The impacted canine was surgically removed and the lateral incisor was extracted (Figure 3 through Figure 5). Site preparation was made at the lateral incisor position using osteotomy drills in a surgical handpiece with irrigation.

Prior to fixture placement, 1 cc of NovaBone® (NovaBone Products, LLC, www.novabone.com), a calcium phospho silicate graft material, was placed into the defect (Figure 6 and Figure 7). Next, a NobelBiocare (www.nobelbiocare.com) fixture with a 3.5-mm diameter and a 13-mm length and a trilobe connector was placed in osteotomy at the lateral incisor position (Figure 8 and Figure 9). Additional NovaBone (1 cc) was placed in the defect created by the extracted maxillary canine (Figure 10). A resorbable collagen membrane, BioMend® (Zimmer Dental, Inc., www.zimmerdental.com) was placed over the graft and the site was closed with Cytoplast® (Osteogenics Biomedical, osteogenics.com), a non-resorbable PTFE monofilament suture material used in an interrupted manner to close the flap (Figure 11). A radiograph was taken to document the implant position and fill of the defect by graft material (Figure 12). An Essix-style provisional appliance was provided to the patient. At the suture removal appointment 2 weeks after surgery, the patient indicated that she wished to have a fixed-style provisional. An impression was taken using a medium-body PVS impression material in a full-arch tray and counter impression. Models were fabricated from the impressions and a Ribbond® (Ribbond, www.ribbon.com) reinforced composite bridge was fabricated with a lingual wing on the tooth adjacent to the site on the mesial and distal. The provisional fixed bridge was luted to the teeth using Maxcem Elite™, a self-etch resin cement (Kerr Sybron Dental Specialties, www.kerrdental.com).

The implant and graft were allowed to heal for 5 months before restoration was initiated. The provisional fixed bridge was removed and the healing screw on the implant fixture was removed and replaced with a gingival former and the fixed provisional was modified to fit the site and reluted. Two weeks later, the provisional was again removed and the gingival former removed from the implant and a closed-tray impression taken. The gingival former and provisional bridge were reinserted.

Models were fabricated with a soft-tissue maxillary cast at the laboratory. A stock titanium abutment was milled by the laboratory for margin placement and ideal shape. A zirconia crown was fabricated and returned with the abutment for insertion. The patient presented and the provisional bridge was removed as well as the gingival former. The customized stock abutment was inserted and the fixation screw tightened to finger tightness and a radiograph was taken to verify mating of the abutment and implant (Figure 13). The fixation screw was then tightened to 30 Ncm with a torque wrench and the access hole was closed with a cotton pellet. The crown was tried in and occlusion was checked and adjusted as needed. Maxcem Elite was used to lute the crown and following setting of the cement, any excess was cleaned marginally (Figure 14).

Discussion

Impacted teeth can form cysts around the coronal aspect of the tooth and resorption of the roots of the neighboring permanent teeth can be a complication. Maxillary impacted canines can be treated orthodontically, but if that treatment option is not feasible their surgical removal remains the only treatment option available. It is important to extract teeth atraumatically to preserve available bone for placement of immediate implants. However, following the extraction of an impacted tooth, a significant bone defect remains, making it difficult for an immediate implant placement.¹² In such cases bone grafts should be used to provide primary stability to the implant and speed site fill/healing.

There are various treatment methods for treating an impacted canine, and the treatment plan depends on the case. Usually in impacted canine cases, primary canines are retained in the arch, with impaction of the permanent canine placed palatally in the maxilla. Surgical removal of the impacted canine and retained primary tooth with immediate implant placement may be done to replace the missing canine. In a few cases, it may be necessary to increase the space in the arch via orthodontic treatment, and immediate implants are then placed after surgical removal of impacted tooth.

However, in the case presented, there was no retained primary canine. Additionally, the impacted maxillary canine was present labially in the arch



FIG. 2



FIG. 3



FIG. 4



FIG. 5

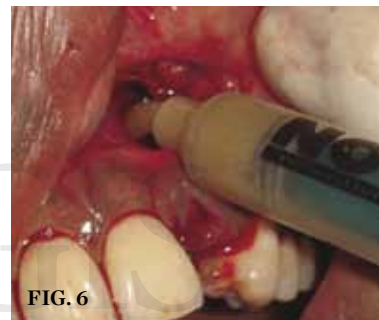


FIG. 6

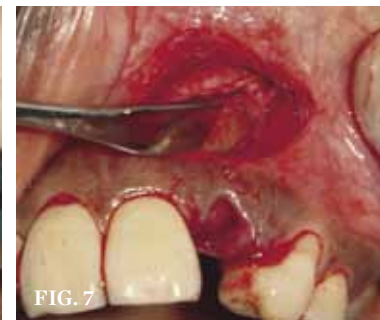


FIG. 7



FIG. 8



FIG. 9



FIG. 10



FIG. 11

CASE PRESENTATION (2.) Semi-lunar full-thickness flap reflected, showing the coronal aspect of the impacted canine. (3.) Resulting defect following extraction of the impacted canine. (4.) Atraumatic extraction of the lateral incisor. (5.) Communication between the lateral incisor extraction site and impacted canine site but the buccal crestal ridge has been preserved. (6. AND 7.) NovaBone being utilized for the bone graft over the facial defect. (8.) The implant was placed into the osteotomy. (9.) The implant was seated in the osteotomy demonstrating the apical aspect of the fixture visible in the defect. (10.) Additional NovaBone was placed over the exposed implant and filling the defect. (11.) The surgical site was closed with sutures and a healing screw was placed in the implant.

apical to the lateral incisor. The resulting resorption and mobility of the lateral incisor necessitated its extraction. As sufficient crestal ridge was present to allow initial stability of an immediately placed implant fixture, this was possible at the time of the extractions.

Conclusion

Treatment of impacted maxillary cuspids can present challenges when implants are considered in that area. Preservation of the buccal crestal ridge can allow for the immediate placement of an implant at the time of extraction. Additionally, osseous grafting assists in filling the resulting defect created by extraction of the impacted cuspid.

References

1. Jarjoura K, Crespo P, Fine JB. Maxillary canine impaction: orthodontic and surgical management. *Compend Contin Educ Dent.* 2002;23(1):23-26.
2. Cooke J, Wang HL. Canine impactions: incidence and management. *Int J Periodontics Restorative Dent.* 2006;26(5):483-491.
3. Sagne S, Thilander B. Transalveolar transplantation of maxillary canines. A follow-up study. *Eur J Orthod.* 1990;12(2):140-147.
4. Ioannidou E, Makris GP. Twelve-year follow-up of an autogenous mandible canine transplant. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2003;96(5):582-590.
5. Schwartz-Arad D, Grossman Y, Chaushu G. The clinical effectiveness of implants placed into fresh extraction sites of molar teeth. *J Periodontol.* 2000;71(5):839-844.
6. Parel SM, Triplett RJ. Immediate fixture placement: treatment planning alternative. *Int J Oral Maxillofac Implant.* 1990;5(4):337-345.
7. Tolman DE, Keller EE. Endosseous placement immediately following dental extraction and alveoplasty: preliminary report with 6-year follow up. *Int J Oral Maxillofac Implant.* 1991;6(1):24-28.
8. Rosenquist B, Grenthe B. Immediate placement of implant into extraction sockets: implant survival. *Int J Oral Maxillofac Implant.* 1996;11(2):205-209.
9. Mazor Z, Peleg M, Redlich M. Immediate placement of implants in extraction sites of maxillary impacted canine. *J Am Dent Assoc.* 1999;130(12):1767-1770.
10. Cardaropoli D, Debernardi C, Cardaropoli G. Immediate placement of implant into impacted maxillary canine extraction socket. *Int J Periodontics Restorative Dent.* 2007;27(1):71-77.
11. Peñarrocha M, Peñarrocha M, García B, Larrazabal C. Extraction of Impacted Maxillary Canines With Simultaneous Implant Placement. *J Oral Maxillofac Surg.* 2007;65(11):2336-2339.
12. Garcia B, Boronat A, Larrazabal C, et al. Immediate implants after the removal of maxillary impacted canines: a clinical series of nine patients. *Int J Oral Maxillofac Implants.* 2009;24(2):348-352.



CASE PRESENTATION (12.) Radiograph at implant placement with graft filling the defect. **(13.)** Radiograph of the restored implant showing healing of the grafted defect. **(14.)** Facial view following insertion of the abutment head and zirconia crown.